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EMBRYO THAW-SURVIVAL FOLLOWING VITRIFICATION: A COMPARISON OF THE DROPLET "IGLOO" METHOD AND MINIMAL VOLUME LOADING TECHNIQUES

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Title:

EMBRYO THAW-SURVIVAL FOLLOWING VITRIFICATION: A COMPARISON OF THE DROPLET "IGLOO" METHOD AND MINIMAL VOLUME LOADING TECHNIQUES

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References:
1. A review of best practices of rapid-cooling vitrification for oocytes and embryos: a committee opinion. *Fertil Steril.* 2021 Feb;115(2):305-310. doi: 10.1016/j.fertnstert.2020.11.017.
2. An L. Efficient cryopreservation of mouse embryos by modified droplet vitrification (MDV). *Cryobiology.* 2015 Aug;71(1):70-6.

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Abstract Text:

OBJECTIVE: Embryo vitrification begins with a brief wash in equilibration and vitrification solution (VS) before the embryo is loaded onto a cryopreservation device. Minimal volume (MV) techniques remove excess VS after embryo placement in the cryopreservation device. However, MV has been associated with increased mechanical manipulation to the embryo. The alternative approach (IGLOO) adds VS via a droplet after embryo placement, reducing surface tension and supporting faster embryo recovery after thaw. Whether thaw survival and pregnancy rates are influenced by the absence or presence of the VS droplet after embryo loading remains unclear. This study assesses clinical outcomes following vitrification with embryo loading using the MV technique versus the IGLOO protocol.

MATERIALS AND METHODS: All intended euploid frozen embryo transfers (FET) from 2016 to 2025 were included. Cases were allocated based on the vitrification protocol: MV or IGLOO. The primary outcome is thaw-survival rates. Secondary outcomes included pregnancy outcomes after euploid FET. Dispersion, univariate, and adjusted multivariate GEE analyses were performed. A sample size of 769 cases per group was calculated to achieve 80% power to detect a 3% difference in survival rates ($\alpha=0.05$).

RESULTS: A total of 15,523 euploid FETs were included, with 13,485 in MV cohort and 2,038 in the IGLOO cohorts. Embryos using the IGLOO method demonstrated significantly higher post-thaw survival rates (99.1% vs 98.2%, $p=0.002$) and lower non-survival rates (0.3% vs 1.6%, $p<0.001$) compared to those using the MV technique. A higher percentage of non-recovered embryos was observed with IGLOO (0.5% vs 0.3%, $p=0.03$). Additionally, fewer embryos experienced downgrades in scoring with IGLOO (8.0% vs 16.8%, $p<0.0001$). In multivariate analysis, after adjusting for age, BMI, AMH, year of treatment, embryo grade, and thaw protocol, no association was found between the loading method and odds of non-recovered (aOR=0.43, CI95% 0.11-1.64) or non-surviving (OR=1.83, CI95% 0.81-4.19) embryos at thaw. A significant association was found between MV and embryo downgrading compared to pre-freeze grading scores (OR=1.47, CI95% 1.16-1.86). In univariate analysis, significant differences in pregnancy outcomes favored the IGLOO method, with higher implantation rates (79.1% vs 74.5%, $p<0.001$), lower biochemical pregnancy loss rates (10.4% vs 12.0%, $p<0.001$), higher clinical pregnancy rates (68.8% vs 62.5%, $p<0.001$), and greater live birth rates (61.0% vs 52.7%, $p<0.001$). However, in adjusted analysis, no significant associations were found, and pregnancy outcomes were comparable between the IGLOO and MV methods.

CONCLUSIONS: Embryos vitrified using the IGLOO method appear to better preserve morphological quality during the freeze-thaw cycle compared to those vitrified with the MV method. Besides this potential benefit, pregnancy outcomes are comparable between IGLOO and MV. Prospective trials are needed to provide more definitive evidence.

IMPACT STATEMENT: The IGLOO vitrification method offers a promising alternative to MV, providing enhanced embryo quality post-thaw without compromising pregnancy outcomes.

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Biographical Sketch Early success, marked by his first publication in CELL at Harvard Medical School, inspired Joseph to continue his research endeavors in reproductive endocrinology and infertility. Joseph has been with Reproductive Medicine Associates of New York since 2011. Joseph has authored over 400 peer-reviewed abstracts & manuscripts. Passionate about development, he cultivates relationship with investors & entrepreneurs to advance reproductive endocrinology & infertility care.

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Biographical Sketch Richard Slifkin, MS, TS(ABB), CLT(NYS) serves as the Associate Laboratory Director at Reproductive Medicine Associates of New York. Rick is a frequent presenter and has led the development and dissemination of best practices for embryology laboratory efficiencies and how to employ emerging technologies to lower staff burnout while improving pregnancy rates and integrity of specimen identity.

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Biographical Sketch Christine Briton-Jones, PhD HCLD serves as the Director of Laboratory Services at Reproductive Medicine Associates of New York (RMA of New York) and as a faculty member of the Reproductive Endocrinology and Infertility (REI) fellowship of Mt. Sinai School of Medicine. Prior to joining RMA in 2015, Dr. Briton-Jones trained in Australia and worked in combined research and clinical positions in Australia, Hong Kong, and directorial positions in California, Utah, Idaho and Nevada. Dr. Briton-Jones has over 20 years of experience in clinical embryology and has participated in developing and refining the laboratory techniques that have contributed to the growing success of assisted reproductive technologies with over 150 peer reviewed scientific manuscripts and abstracts published in international journals. While in Hong Kong, Dr. Briton-Jones secured over \$1 million in grants to fund research projects and developed Y-chromosome microdeletion screening services through the Hospital Authority of Hong Kong. While in California, she was the research director for ART Reproductive Center in Beverly Hills, the embryology service for UCLA and Cedars Sinai Medical Center. Dr. Briton-Jones is a frequent presenter at the American Society for Reproductive Medicine's annual conference as well as the Pacific Coast Reproductive Society annual meeting, and was an invited speaker at fertility conferences in the United States, Scotland, England, Canada, Australia, Guadalajara, Mexico, mainland China and Hong Kong. She was an Associate Editor of Reproductive Biology and Endocrinology Journal (RBEJ) from 2005 to 2016 and is an ad hoc reviewer for Fertility and Sterility; Journal of Reproductive Biology and Endocrinology, Reproductive Biology and Endocrinology Journal Online, Journal of Assisted Reproduction and Genetics, Theriogenology Journal, and the Human Reproduction and Molecular Human Reproduction Journals.

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Organization Name	Relationship Type	Who has this Relationship?
Progyny	Company Officer Relationship Began - Friday, August 25, 2017 Relationship Ended - Thursday, June 1, 2023 Paid Consultant Relationship Began - Relationship Ended - Direct Stockholder Relationship Began - Friday, August 25, 2017 Relationship Ended - Friday, November 1, 2024	Self

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